No. 5. — *Reports on the Results of Dredging, under the Supervision of* Alexander Agassiz, *in the Gulf of Mexico and in the Caribbean Sea* (1878–79), *by the U. S. Coast Survey Steamer "Blake,"* Lieut.-Commander C. D. Sigsbee, U. S. N., *and* Commander J. R. Bartlett, U. S. N., Commanding.

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XXV.

Supplementary Report on the Blake Cephalopods. By A. E. Verrill.

The following paper includes the results of an examination of a small collection of Cephalopods received after my former report had been printed. The specimens are not numerous, but among them there are two very remarkable new genera, of unusual interest.

All the specimens in this lot were taken in the West Indian region, and mostly in rather deep water.

Abralia megalops Verrill.

Amer. Jour. Sci., Vol. XXIV. p. 364, 1882.

Plate III. Fig. 4.

A small immature specimen occurred at Station 294, in 137 fathoms, off Barbados, 1878–79.

The body is moderately long, pointed posteriorly, with the anterior mantle-edge prolonged into a broad, blunt median angle. Caudal fins large, the base rather large, occupying nearly one third the length of the mantle. Taken together the outline is broad-rhomboidal, and slightly sagittate; the outer angle of the fin is obtusely pointed; the anterior margin is broadly convexly curved, projecting forward somewhat beyond the base. Head rather large. Eyes very large. Arms slender, the dorsal ones shorter than the others, which are subequal. Tentacular arms long, very slender, more than twice as long as the sessile ones. The connective cartilage at the base of the siphon is large, broadest posteriorly, tapering to a blunt point anteriorly, with a central longitudinal furrow, having thickened margins.

The color is whitish, with rather large, well-separated, reddish brown chromatophores, both above and below ; a large dark brown spot on the head above each eye.

The basal portion of the arms is destitute of suckers for some distance, then there are two alternating rows of small hooks along the middle ; these are followed, distally, by two rows of small oblique suckers, having the horny rim of the orifice armed on the outer or higher side with several long, slender, incurved teeth.

The clubs are small, but distinctly enlarged and bordered by lateral membranes ; in the middle portion there is a row of three or four larger elongated hooks, with a few smaller ones in the same row, and a row of suckers alternating with the hooks ; outside of these, on each side, there is a row of marginal suckers ; at the tip there is a crowded cluster of minute suckers ; on the wrist there is a small group of smooth suckers and tubercles.

Length of the mantle, dorsally, 12 mm.; length of body and head, 14 mm.; breadth of head, 5.5 mm.; breadth across fins, 12 mm.; from tip of tail to anterior lobe of fin, 7 mm.; tip of tail to origin of fin, 6 mm.; length of tentacular arms, 15 mm.

The figure is from the type-specimen taken by the U. S. Fish Commission off Martha's Vineyard, Station 1137, in 173 fathoms.

Sthenoteuthis Bartramii (Les.) Verrill (?).

Verrill, Trans. Conn. Acad., Vol. V., p. 223, 1880, p. 288, 1881.
Ommastrephes Bartramii D'Orbigny, Ceph. Acetab., Pl. 2, figs. 11–20.
Steenstrup, Oversigt k. Danske Vid. Sels. Forhandl., 1880, p. 79, fig. 2, p. 81, fig. 3, p. 89.

A fragment of an arm, from a rather large species of *Ommastrephes* or *Sthenoteuthis*, was obtained by Commander J. R. Bartlett. It was brought up on the sounding lead in 607 fathoms, $4\frac{1}{4}$ miles N. W. $\frac{3}{8}$ W. of Sombrero Light, N. Lat. 18° 36′, W. Long. 63° 32′ 30″ ; temperature of the bottom, 41°.

This fragment is about 60 mm. long and 10 mm. broad at the larger end. It is from the terminal portion of an arm of which the tip had been amputated and healed. The suckers are rather large, on slender pedicles, which arise from swollen elevations on the inner surface of the arm; each margin of the inner face is bordered by a moderately wide, thin, incurved membrane, which is supported by well-marked transverse muscular ridges, which run out from between the bases of the suckers. The suckers are obliquely attached, with very oblique apertures ; the basal half of the cup is much smaller than the outer portion, and is separated from it by a distinct constriction ; the distal portion is obliquely cup-shaped, with the inner side much narrower than the outer ; the margin is supported by a very broad, horny rim ; the outer edge of the aperture is surrounded by a circle of 12 to 14 regular, close, very sharp incurved teeth, of which the median one is not distinctly larger than those adjacent ; the inner half of the border is armed by numerous, very much

smaller, sharp denticles; outside of the horny rim the marginal membrane is covered with a regular circle of minute horny plates.

The transverse breadth of this arm-fragment at the thickest end is 9 mm.; across internal face, with the lateral membranes extended, 15 mm.; length of transverse muscular bands of the marginal membranes, 4 mm.; diameter of the largest suckers, 4 mm.; height of cups, 5 mm. Number of larger teeth on the sucker-rings, 14 to 17; of smaller ones on the inner edge of the rim, 8 to 10.

Cheiroteuthis lacertosa Verrill.

Trans. Conn. Acad., V., p. 408, Pl. 56, figs. 1–1 f, 1881; Report U. S. Fish Commission for 1879, [pp. 119, 209,] Pl. 46, figs. 1–1 f, 1882.

A specimen of this rare species, somewhat smaller than the original type-specimen, was obtained. It has both tentacular arms with the clubs in good condition. It agrees closely with the type-specimen, already described in detail, and figured by me, in all its essential characters. In color it differs only in being somewhat paler, and in having rather distinct pale, or whitish, small round spots scattered over the dorsal surface. The row of dark spots along each of the ventral arms is very distinct.

Measurements of Cheiroteuthis lacertosa.

Length of body to dorsal edge of mantle,	77 mm.
Breadth of body,	14 "
Length of caudal fin,	40 "
Transverse breadth across fins, about	30 "
Length of head from dorsal cartilage to base of arms,	36 "
Breadth of head at eyes,	15 "
Length of dorsal arms,	60 "
" " " 2d pair,	75 "
" " " 3d pair,	96 "
" " " 4th pair,	153 "
Diameter of dorsal arms at base,	4 "
" " " " 2d pair,	5 "
" " " " 3d pair,	5.5 "
" " " " 4th pair,	9 "
Length of tentacular arm,	660 "
Length of club,	60 "
Its breadth, in the middle	8 "
Diameter of largest suckers of lateral arms,	2 "
" " " ventral arms,	1 "

Station 230, in 464 fathoms, off St. Vincent, W. I., 1878–79.

A very large specimen of this species has recently been taken by the U. S. Fish Commission steamer "Albatross," at Station 2074, in 1309 fathoms, N. Lat. 41° 43′, W. Long. 65° 15′ 20″.

NECTOTEUTHIS Verrill, gen. nov.

Sepiolidæ allied to *Stoloteuthis*. Mantle with a free anterior dorsal edge; ventrally forming a sort of shield for the lower surface of the body, and prolonged far forward beyond the eyes, as a broad upturned lobe. Fins large, thin. Eyes large. Arms united by a web of considerable extent. Sessile arms, in the type-specimen (probably male) with the suckers on the distal part very minute, conical, sessile on the ends of stout tapering or conical pedicels; those on the proximal part normal, small, oblique, with slender pedicels. Pen not observed, perhaps wanting. Club of tentacular arms with numerous minute, subequal suckers, in many rows.

Nectoteuthis Pourtalesii Verrill.

Plate III. Figs. 1-1b.

A very small species, remarkable for its short, thick body; the great size of the ventral shield, which extends forward beyond the bases of the ventral arms; and the large conical sucker-pedicels, surmounted by minute suckers, on the distal half of the arms.

Body short, higher than broad, and well rounded behind; dorsal surface convex; the free mantle border is nearly transversely truncated, with a slight lobe in the middle; sides, below the fins, compressed, nearly vertical. A large ovate, convex shield occupies nearly the whole ventral surface, extending backward nearly to the posterior end, covering the whole width in the middle, and extending forward far beyond the lateral and dorsal mantle-margins, and to the anterior portion of the head; the anterior margin of the ventral shield is curved upward, leaving a deep concavity within; this portion of the ventral shield conceals and protects the entire lower surface of the head and siphon; on the sides, the margin recedes in such a way as to leave the large, prominent eyes exposed. The fins are attached above the middle line of the body; moderately large, very thin and delicate, transparent, except at base, with the margin undulated in the preserved specimen; the bases of the fins extend forward close to the margin of the mantle and backward about half the length of the body; the anterior end is evenly rounded, forming nearly a semicircle. Head large, as broad as the body, narrowed in front. The eyes, which are very large and prominent, occupy nearly the whole of the sides of the head; eyelids thin but distinct; pupil round. Arms small, slender, unequal in size and length, and connected together for some distance by a basal web, which extends farthest between the dorsal arms and is wanting between the ventral pair. The web has an outer fold, as it passes the second pair of arms, so that the latter appear to be inside the edge of the web. Dorsal arms much shorter than the lateral and ventral pairs, the free tips projecting but little beyond the edge of the web. The arms increase successively in length from the dorsal to the ventral pairs, which scarcely exceed the third pair, but all have the same kinds of suckers, in

two alternating rows ; the free portion is slender, rounded externally, and tapers to a slender tip ; on the distal half, the sucker-pedicels are long, very prominent, conical, larger than the suckers, and tapering toward the tip, which terminates in a minute conical sucker, without any constriction between it and the pedicel ; of these there are ten or more pairs on the lateral and ventral arms, and four or five pairs on the dorsal arms ; the length of the sucker-pedicels and suckers together is greater than the diameter of the arms ; on the basal half of the arms the suckers are of the ordinary structure, as in *Rossia ;* they are small, with small apertures, oblong, obliquely attached, on short, slender pedicels, which are surrounded by submarginal swellings of the arm-surface. Of these normal suckers there are nine to ten pairs on the lateral and ventral arms ; of these two or three, at about the sixth or seventh pair, on the lateral arms, are distinctly larger than those before or beyond them. One or two of intermediate form connect the normal with the specialized suckers. The dorsal arms are united together along their inner surfaces, which turn toward each other, for some distance from the base by a thickened membranous fold, which forms a sort of pocket or sinus between the arms, probably for sexual purposes. Tentacular arms are long, slender, triquetral, tapering distally; club small, curled, a little wider than the portion of the arm just below it, covered with numerous very minute suckers, arranged in many rows.

Siphon relatively large and prominent, projecting forward in front of the bases of the ventral arms.

Measurements of Nectoteuthis Pourtalesii.

Length to tip of longest sessile arm,	24	mm.
" dorsal edge of mantle,	11	"
" ventral edge of mantle,	17	"
" bases of lateral arms,	17	"
Breadth of body (or head),	10	"
Diameter of eyeball,	6	"
Longitudinal extent of fin,	10	"
Breadth from base to outer edge,	6	"
Length of its insertion,	7	"
" dorsal arms,	6	"
" second pair,	7.5	"
" third pair,	8.5	"
" ventral arms,	10	"
" tentacular arms,	30	"
" club,	3	"

Color of the dorsal and lateral surfaces of alcoholic specimen dark reddish brown, due to a large number of chromatophores, which extend but a short distance beyond the bases of the fins ; sides of the head, above the eyes, darker brown ; ventral shield dark purplish brown, caused by great numbers of very minute chromatophores ; its margin is surrounded by a pale band ; arms and

sucker-pedicels yellowish white, with a few small brown chromatophores; the outer portion of the fins is yellowish white and probably transparent when living.

The sex of the single example was not determined. Possibly the remarkable suckers and pedicels on the distal half of the arms may be due to hectocotylization, peculiar to the male. In this example the dorsal arms are closely united together, to near the tips, and within the web the basal portion is much thickened and the suckers are crowded and partially concealed by the incurved margins of the arms, and by their facing strongly toward each other. This may also be a sexual character.

Station 295, in 180 fathoms, off Barbados, Blake Expedition, 1878–79.

This curious species has a striking general resemblance to *Stoloteuthis leucoptera* V., from deep water off the New England coast. It is readily distinguished by the free dorsal edge of the mantle, by the ventral shield projecting much farther forward, and by the remarkable form and structure of the distal sucker-pedicels and suckers. The fins are smaller, and the arms more slender It is probable that the unique specimen is a male, and that some of the peculiar features of the arms and suckers may be only sexual.

Rossia brachyura Verrill, sp. nov.

Plate III. Fig. 2.

A small species with a very short body, large fins, and very small suckers, in two rows on the basal part of the arms, but in four rows distally.

Body unusually short, scarcely longer than broad, broadly rounded and somewhat emarginate posteriorly; mantle-edge advancing in a broad obtuse lobe dorsally, extending farther forward with a slight median emargination ventrally. Fins very large and prominent, the insertion equal to about three quarters the length of the body, the outer margin thin and broadly rounded, the anterior lobe free, rounded, and projecting forward beyond the mantle-edge, the posterior margin also free and projecting back somewhat as a rounded lobe, reaching nearly to the end of the body. Eyes large, with the lower lid slightly thickened. Sessile arms rather long, subequal in length, the dorsal ones a little shorter than the others. The suckers are similar in size and arrangement on all the sessile arms; on the basal third they are arranged in two rows; farther out they form four rows, which become crowded toward the tips. The suckers are very small, oblique, deep urceolate, with small apertures; they decrease regularly from near the middle to the tips of the arms. Tentacular arms moderately long and stout; club rather large, distinctly thickened, with a high dorsal keel; suckers very numerous and small, campanulate, crowded in about 16 rows, decreasing gradually in size from the upper to the lower edge, where they become very minute.

Color, in alcohol, pale purplish brown, with numerous small, unequal chromatophores, beneath as well as above; arms paler; fins whitish.

Length of body, above, 18 mm.; of body and head, 27 mm.; breadth of body, 15 mm.; length of insertion of fin, 12 mm.; its greatest length, front to back edge, 16 mm.; height, base to tip, 9 mm.; length of dorsal arms, 15 mm.; 2d pair, 17 mm.; 3d pair, 18 mm.; 4th pair, 17 mm.; of tentacular arms, 28 mm.; of club, 12 mm.; diameter of largest suckers of lateral arms, 60 mm.; of largest suckers of tentacular clubs, 12 mm.

Station 148, in 208 fathoms, off St. Kitts, 1878–79. One female.

Heteroteuthis tenera Verrill.

Amer. Jour. Sci., XX., p. 392, 1880; Bulletin Mus. Comp. Zoöl., XIII., p. 103, Pl. 3, figs. 5–5 b; Pl. 7, figs. 2–2 d, 3–3 b, 1881; Trans. Conn. Acad., V., p. 357, Pl. 46, figs. 2–2 d, 3–3 b, Pl. 47, figs. 5–5 b, 1881; Report U. S. Fish Com. for 1879, [p. 175,] Pl. 33, Pl. 34, fig. 1, 1882.

One specimen (♀), from Station 148, in 208 fathoms, off St. Kitts.

Octopus tuberculatus Blainv.?

A species with long arms, a short basal web, and peculiar branched cirri above the eyes and scattered over the back. Probably young.

The body is moderately large, oblong, swollen below, well rounded behind. Head about as broad as the body, with large prominent eyes. Upper surface of the body and head thickly covered with rather small, low warts, which also extend along the dorsal sides of the arms and on the basal web; scattered over the upper surface of the body and head are prominent cirri, some of which are simple and tapered, while others are divided into three to five digitate lobes or branches; of these, two are situated in the median dorsal line, four form a quadrangle on the dorsal surface of the body, and two are situated on each side of the body in line with the eyes; on the head, one is situated in the median dorsal line between the bases of the dorsal arms; one much larger and more complicated than the others is situated above each eye; this may have seven or eight slender branches; the eyelids are covered with prominent warts; the lower surface of the body is paler and smoother, with only minute inconspicuous warts, more evident anteriorly. Siphon moderately large, strongly tapered. The arms are long and rather slender, tapering to slender tips; they are subequal in size and length, the ventral ones a little smaller and shorter; the suckers are rather small, the two rows well apart; the two basal ones are much smaller than the succeeding ones and stand nearly in the median line. The basal web extends about one third the length of the arms; the arms are bordered for some distance by a thin, narrow, marginal membrane on each side. The hectocotylized arm is but little shorter than its mate, and tapers to an acute but modified tip; along the border of the arm there is an incurved marginal groove formed by the narrow, inflexed marginal membrane, which terminates

in a minute conical papilla at the base of the modified tip; this is very small, narrow, tapered, acute, with thickened margins and a narrow median groove, which is crossed by numerous, very small, transverse furrows. Color of the upper surface of the body, head, and basal web pale purplish brown, mottled and streaked with darker; the color is due to numerous minute purplish chromatophores, among which there are a few larger, more definite, dark brown ones; the warts appear to have been paler; the cirri are yellowish white without chromatophores. The lower side of the body, head, siphon, and arms, with the inner surface of the arms, is yellowish white, having very few chromatophores, among which are a few very definite, small, dark brown ones.

Length of body, 17 mm.; of body and head, 22 mm.; breadth of body, 13 mm.; of head, 13 mm.; breadth of web, from mouth, 13 mm.; length of second pair of arms, 52 mm.; of first pair, 50 mm.; of third pair, 51 mm.; of the ventral arms, 50 mm.; of the hectocotylized arm, 45 mm.; length of the modified tip, 2.5 mm.; its breadth, 1 mm.

Stations 278, in 69 fathoms, and 296, in 84 fathoms, off Barbados, 1878–79. Three specimens.

Octopus pictus Verrill, sp. nov.

Plate III. Fig. 3.

Body relatively large, oblong, smooth, bluntly rounded posteriorly. There is no constriction between the head and body, and the head is rather broader than the body; eyes large, rather prominent. There is a single small rounded wart over each eye. Web between the arms rather small, thin, extending about one fourth the length of the arms, narrower between the ventral arms. Arms moderately long, nearly equal in size and length. Suckers relatively large, in two rows, not crowded; the two basal suckers are small, nearly in the middle line, the innermost ones forming a regular circle around the mouth. The color is peculiar; over the entire surface of the body, above and below, and on the upper surfaces of head, arms, and web, there are numerous rather large distinct, round, reddish brown or dark brown spots, usually with a darker central point; between these there are numerous minute, lighter colored chromatophores; inner surfaces of the web and arms yellowish white.

Length of the head and body, 8 mm.; breadth of body, 6 mm.; length of the arms, 16 mm.

Station 142, in 27 fathoms, Flannegan Passage, and Station 278, in 69 fathoms, off Barbados, 1878–79. One young specimen from each place.

Although the specimens are probably the young of some larger species, it is unlike any of the described West Indian forms known to me in its peculiar ocellated coloration and the very smooth surface of its body, with only a single wart above the eye.

OPISTHOTEUTHIS Verrill, gen. nov.

Body broad, depressed, closely united to the brachial web except at the posterior end, which projects slightly. Fins long, attached at about the middle of the body, near the dorsal surface; bases wide apart, each supported by a distinct transverse cartilage. Siphon small, projecting slightly from beneath the posterior end of the body, and directed backward, with a very small aperture. Head as broad as the body; eyes large. The lower surface of the head and body wholly attached to the brachial membranes. Arms subequal, united together to near their tips by a very broad, thick, soft web, which leaves only the inner surface of the arms exposed; suckers in a single row, those toward the base of the arms largest. On each side and alternating with the suckers is a row of small, tapered cirri; these commence in a rudimentary form between the first two suckers, and continue from there to the tips.

Opisthoteuthis Agassizii Verrill, sp. nov.

Plate I. Fig. 1. Plate II. Fig. 1.

The body is broad, depressed, rounded posteriorly, and with the head is wholly adnate to the web connecting the arms, except at the posterior end behind the fins, where it is slightly free and overhangs a little; the siphon projects backward beneath the posterior end in the groove thus formed; the branchial opening appears to have been small, partially surrounding the siphon, but the membranes in this region are much mutilated, so that its form and extent cannot be determined. The fins are large, thin, wide apart, elongated, oblong ovate in form, the outer end bluntly rounded, each fin is supported by a separate internal cartilage, of which the inner end is broadest and thick, while the outer end extending into the free portion of the fin is much thinner, lanceolate, tapering to a blunt point; this cartilage is situated much nearer to the posterior than to the anterior edge of the fin and does not extend much beyond its middle, leaving the terminal third thin and flexible. The head is about as large and as broad as the body; the eyes are very large and occupy the entire sides of the head. As seen from above the arms are concealed except at the tip by a thick, soft web, which unites them together and unites them closely to the sides of the head and body. The integument of the entire upper surface is very soft and flabby, and appears to have been smooth, although it is much wrinkled in the alcoholic specimen; the web between the arms extends to near the end, leaving only about one fifth free, and this portion is bordered by a membranous fold along each side. The web consists of an outer and inner portion, separated by considerable thickness; the inner membrane arises from the inner surface of the arms, which projects but little above it. The arms are rather large and moderately stout along the middle portion, much narrowed toward the bases, which are not in contact; the free ends are rather slender,

compressed, with the tips attenuated; the first five suckers are much smaller than those that follow; the next five or six suckers are the largest; they decrease to about the tenth, and then become larger opposite the edge of the web, finally diminishing gradually to the tips; the cirri, which alternate with the suckers on each side, are widely separated from them along the middle of the arms; they are small, slender, tapered, acute, dark purplish brown in color; those toward the tip and close to the base of the arms are very small. The beak is moderately large, black. The buccal membrane is covered with small verrucæ.

Color of the upper surface chocolate-brown, with small scattered roundish spots of yellowish white. Fins paler brown. Inner surface of the web dark chocolate-brown. Inner surface of the arms much paler than the web.

Length of body and head, to base of arms, 60 mm.; breadth of body, 50 mm.; breadth of head across eyes, 52 mm.; extreme breadth across fins, 105 mm.; from base of fin to tip, 30 mm.; anterior to posterior edge, 17 mm.; diameter of eyes, 25 mm.; breadth of interbrachial web, from mouth, 75 mm.; length of dorsal arms, 130 mm.; of lateral arms, 120 mm.; of ventral arms, 130 mm.; greatest breadth of dorsal arms, 9 mm.: diameter of largest suckers, 3 mm.; length of cirri, 2 to 3 mm.

Station 260, in 291 fathoms, off Grenada, Blake Expedition, 1878–79.

This remarkable species differs widely from any hitherto described. It is more closely related to *Stauroteuthis sertensis* than to any other known species; from the latter and from *Cirrhoteuthis* it differs in having the body and head closely adnate to the brachial membranes so as to entirely conceal the ventral portions; in the posterior position of the siphon; and in the arrangement of the cirri on the inner surface of the arms. The fins appear to be larger and more highly developed than in either of the genera referred to. The transverse supporting cartilages are not united across the back, as they appear to be in both the related genera. The arrangement of the web between the arms appears to be unlike that of *Stauroteuthis*, but the only known specimen of the latter was in such a poor state of preservation as to render this statement unreliable. Perhaps the most remarkable characteristic of this species is the posterior position of the siphon and branchial opening, a position which is rendered necessary by reason of the close attachment of the head and body to the brachial membrane. The condition of the internal parts of the specimen is such as to render it impossible to determine the precise character and position of the branchial opening and gills. Only one specimen was obtained, and this is probably a female, for no evidence of hectocotylization can be detected on any of the arms, all of which are well preserved.

New Haven, October, 1883.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. *Opisthoteuthis Agassizii* Verrill. Dorsal view. Natural size.

PLATE II.

Fig. 1. *Opisthoteuthis Agassizii* Verrill. Ventral view, showing the arrangement of the suckers and cirri. Natural size.

PLATE III.

Fig. 1. *Nectoteuthis Pourtalesii* Verrill. Dorsal view. Enlarged two diameters.
" 1a. The same. Enlarged two diameters.
" 1b. The same. Left arm of the fourth pair. Side view. Enlarged four diameters.
" 2. *Rossia brachyura* Verrill. Left arm of the second pair. Front view. Enlarged four diameters.
" 3. *Octopus pictus* Verrill. Dorsal view. Enlarged three diameters.
" 4. *Abralia megaptera* Verrill. Ventral view of the type-specimen from Station 1137, in 173 fathoms. Enlarged two diameters.